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REGENERATION OF TISSUE INTO THE PULP CANAL OF MONKEY'S TEETH*

ROBERT V. VIDAIR, D.D.S. and EARL O. BUTCHER, Ph.D.

INTRODUCTION

Other investigators have made numerous studies on pulp repair and treatment of exposed and diseased pulps. In some instances, the pulps have been treated with zinc-oxide eugenol, calcium hydroxide, or various other materials, while in other cases antibiotics have been added to the bases.[1, 2] Following such treatment, bridges of dentin and modifications of pulp repair have often formed at the site of the exposure. We[3] have noted invasion of the pulp canal with connective tissue in replanted teeth of the monkey after the pulps were completely removed. As a result of these various observations, there seems justification for believing that the connective tissue possesses considerable potentiality for repair and invasion of the canal. One is confronted with the problem if it will invade after extensive infection and removal of the pulp, sterilization of the canal, and application of therapy which may include antibiotics. To what extent the apical tissue retains its capacity to regenerate under these conditions is not known.

One may ask, what the advantages of regeneration of connective tissue into the pulp canal would be over the common practice of removing the diseased pulp and the complete filling of the canal as is commonly practiced in root canal therapy. The increased moisture of the tooth from the invading tissue, resulting in less brittleness, would certainly be an asset.

The invading tissue may very well not have odontoblastic potentialities and the tooth sensitiveness for diagnostic purposes may also not be too great, yet the less susceptibility to fracture seems very desirable.

The present investigation is concerned with exposing the pulps and obtaining infections, then removing the pulps and seeing to what extent the infection can be completely eradicated and to what extent the connective tissue will invade the pulp canal.

METHODS AND OBSERVATIONS

Twenty Rhesus monkeys were used in this study. Experimentation was confined to the incisors and canines. In all experiments, over 200 teeth were studied. X-rays were taken at various intervals. Teeth were left as long as 300 days after treatment. At the conclusion of the experiment, the teeth were extracted and histologically prepared, or the monkey was sacrificed and the jaw with the intact teeth was fixed, sectioned, and stained. According to the treatment and results, the experiments were divided into 6 groups.

Group 1. The teeth were extracted, pulps removed via the apical approach and the teeth immersed in 10% formalin for 10 minutes to an hour prior to replantation. A total of 10 teeth were used in this experiment.

In this group, dense connective tissue invaded the pulp canal (fig. 1). At the apex slightly looser connective tissue usually existed in which bone spicules were commonly found. Much resorption and ankylosis prevailed along the root as is usually found in replanted teeth. The conditions just described were typical regardless of whether the tooth was immersed in formalin for ten minutes or for an hour. Such regeneration occurred in the majority of the operations.

Group 2. Pulps were removed via the incisal approach, the canals mechanically cleaned, and the coronal portions immediately filled with gutta percha or amalgam. Twelve teeth were treated in this manner. Invasion of the pulp canal with connective tissue occurred in 40% of the cases while granular tissue was common in the other 60%.

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Fig. 1. Typical example of a tooth extracted, pulp removed by apical approach, immersed in 10% formalin 15 min., sterile water 10 min., replanted and left 64 days. X15

Fig. 2. Shows results when pulp was removed via incisal approach, canal flushed out with 10% formalin, coronal portion filled with gutta percha, and left 74 days. X15

Group 3. Pulps were removed via incisal approach, the canals were flushed with 10% formalin and the coronal portions of the teeth were filled with gutta percha or amalgam. Eight teeth were used in these experiments.

In this group there was good repair and invasion of the connective tissue into the pulp canal in 60% of the cases. Figure 2 shows such an instance and bone has been deposited around some of the dentin chips which had not been removed. No odontoblasts are present. Sterilization of the canal with formalin thus increased the percentage of cases in which invasion took place. In both groups 2 and 3 near the filling of either amalgam or gutta percha in the coronal portion, there was always an area of granulated tissue and no bony bridges were ever found. Apparently the filling was not conducive to the formation of bone.

Group 4. Pulps were exposed for 2-14 days. Infected pulps were removed and the canals flushed with either hydrogen peroxide, 10% formalin, mono-chlor-phenol, clorpactin, or formo-cresol. Attempts were also made to digest infected material from several canals with streptokinase. Calcium hydroxide in a methyl cellulose paste and zinc oxyphosphate cement were placed in the coronal portion prior to the amalgam filling. Forty-five teeth were treated in this manner.

In this group the infections were seldom removed. In many instances teeth were opened for a second time and the flushing repeated or digestion of the infection with streptokinase was attempted; yet this procedure was not successful in eradicating the infection. The extent of regeneration seemed proportional to the extent of infection which rather closely correlated with the length of exposure. In the case cited, the pulp was exposed for two days, removed and the canal flushed with mono-chlor-phenol. After 120 days there is invasion of connective tissue to the extent of about a third of the length of the canal (fig. 3). The rest of the canal shows an acute inflammatory reaction. Apparently infection or changes in the dentin in

Fig. 3. Pulp exposed for two days, pulp removed, flushed canal with mono-chlor-phenol, filled coronal portion with CaOH, zinc oxyphosphate and amalgam, left 120 days. Connective tissue fills approximately ⅓ of the canal and there is an acute inflammatory reaction in the rest. X15

Fig. 4. Pulp exposed 6 days, tooth extracted and pulp removed via apex; immersed in mono-chlor-phenol for 15 minutes, rinsed in sterile water, filled coronal portion of canal, replanted and left for 120 days. There is an acute inflammatory reaction. The tissue has regenerated only slightly into the canal. X15

the incisal portion of the pulp canal inhibited regeneration. One hundred and twenty days should have been enough time for complete regeneration since this was accomplished in group 1 after 64 days.

Group 5. Pulps were exposed for 2-14 days, infected pulps were removed, canals were flushed with the different solutions used in group 4. Filled canals either with PBSC, terramycin hydrochloride, streptomycin, 8% calcium gluconate, or penicillin G. Filled coronal portions of teeth as in group 4. Over 100 teeth were experimented on in this group.

In this group where antibiotics were used in addition to the sterilization of the canal, no greater success in eradicating the infection and securing regeneration was accomplished than with sterilizing and digesting substances alone. In many instances the same tooth was opened at successive intervals, flushed with sterilizing substances and the canal filled with the antibiotic. Some teeth were left as long as 286 days after the last treatment, yet when the teeth were histologically sectioned, radicular cysts or granular tissue existed at the apex; the rest of the canal being entirely empty. Of the antibiotics used, there has been no evidence that any one was more effective than the other.

In these last groups (4 and 5) of experiments apparently infection was never completely eradicated even though x-rays and external appearance often indicated a healthy condition. Infection or changes induced by the infection must have been the inhibiting factor to regeneration. In groups 1 and 2 where there was less chance for infection, there was invasion of most of the canal by the tissue. In order to eradicate the infection as much as possible, the next group of experiments was performed.

Group 6. The pulps were exposed and left exposed for 2-14 days. Teeth were extracted; infected pulps were thoroughly removed via the apex and the teeth were immersed in the sterilizing substances used in group 4. The coronal portions of the teeth were filled as in group 4, prior to replanting. Sixteen teeth were treated

in this manner. Figure 4 shows typical results which consisted of invasion of the apex, about 1/3 of the canal being filled with connective tissue.

Sterile conditions were undoubtedly established in the canal by this treatment, yet tissue did not invade the entire canal. What then existed which could have been the inhibiting factor to regeneration? There is the possibility that necrotic tissue remained in the dentinal tubules, infection existed in the tubules, or there were changes in the dentin which were not conducive to tissue growth.

The interval of exposure supplied evidence for this hypothesis. When the pulp was exposed for two days, removed, and the canal sterilized, only the apical portion of the canal was invaded by tissue. When the exposure was for a longer interval, 6-14 days, then there was seldom any invasion of the canal regardless of the sterilization or therapy with antibiotics.

In other words, the longer the exposure, the greater was the depth of infection which determined the extent of future invasion of connective tissue into the canal.

SUMMARY

1. If infection has not had a chance to progress, connective tissue will regenerate into the pulp canal. Evidence for this conclusion is based upon the following facts: the tissue will regenerate in extracted teeth which have been depulped; it will regenerate in extracted, depulped teeth after the teeth are immersed in formalin, and it will usually regenerate when the pulp is removed via the incisal end and the coronal portion of the tooth is immediately filled.

2. The interval of pulp exposure determined the extent of regeneration of connective tissue into the canal. If the exposure is long and the pulp removed, invasion of the canal by connective tissue fails regardless of the sterilization of the canal and therapy with antibiotics. The inhibition to the invasion may be due to necrotic tissue left in the dentinal tubules, infection in the tubules, or alteration in the dentinal substance.

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CRESCENTIA HISTOREGENERATIVE A IN LE CANAL PULPAR DE DENTES SIMIAN

Dr. chir. dent. Robert V. Vidair e Dr. phil. Earl O. Butcher

SUMMARIO IN INTERLINGUA

Altere investigatores ha executate numerose studios in re le reparation de pulpa e le tractamento de exponite e morbific pulpa. In alicun casos le pulpas esseva tractate con eugenol a oxydo de zinc, hydroxido de calcium, o varie altere materiales, durante que in altere casos antibioticos esseva addite al bases. Post tal tractamento, pontes de dentina e modificationes de reparationes del pulpa se ha frequentemente formate al sito del exposition. Nos ha observate le invasion del canal pulpar per texito conjunctive in replantate dentes de simias post que le pulpa habeva essite completemente obliterate. Super le base de iste varie constatationes nos crede justificate le conclusion que le texito conjunctive possede un considerabile potential reparatori per invader le canal. Le question se presenta si un tal invasion pote occurrer post un extense infection con obliteration del pulpa, sterilisation del canal, e applicationes therapeutic que possibilemente include le uso de antibioticos. A qual grado le texito apical retene sub iste

conditiones su capacitate regenerative non es cognoscite.

Si le infection non ha habite le opportunitate de progreder, texito conjunctive va regenerar se e invader le canal pulpar. Iste conclusion es supportate per le sequente factos: Le texito se regenera in dentes extrahite que ha essite dispulpate; le texito se regenera in dispulpate dentes extrahite que habeva essite immergite in formalina; e le texito se regenera usualmente si le pulpa es obliterate via le extremitate incisional e si le portion coronal del dente es immediatemente replenate.

Le duration del exposition del pulpa determina le grado del crescentia regenerative del texito conjunctive a in le canal. Si le exposition es a longe durantia e si alora le pulpa es obliterate, le invasion del canal per texito conjunctive non succede, sin reguardo al sterilisation del canal e a therapia con antibioticos. In tal casos le inhibition del invasion es possibilemente causate per restos de texito necrotic in le tubulos de dentina, per infection intra le tubulos, o per un alteration del substantia dental.

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DENTAL EDUCATION AND MEDICAL-DENTAL RELATIONS*

ALBERT L. MIDGLEY, D.M.D., Sc.D.

It is a pleasure to be here to present some thoughts that may be helpful in stimulating medical-dental growth. Experiences of the past, activities of the present, and plans for the future have passed in review in an attempt to learn what destiny awaits the democratic American program of medical-dental relations.

Our purpose is to extend and strengthen these relations in order that dentistry may become the full service equivalent of an oral specialty of medical practice, not in name only but in reality as well. With the attainment of this status, an acceptable program of health service for the whole man can be formulated, thereby closing the gap that followed the divergence of dentistry from medicine in 1839.

It appears worth while to present briefly some items of historic interest as well as current activities that may be helpful in meeting fully the responsibilities incident to the attainment of an acknowledged specialty of dental and oral medicine.

During the first decade of the century and the greater part of the second, there were many disagreements which were retarding growth in stature and in substance. These differences prevailed because of existing deficiencies such as lack of funds for the proper operation of schools, since some schools were supported almost solely by student enrolment and infirmary fees; perplexing problems with two dental faculty associations in operation at the same time; and the firmly entrenched commercial influences, namely, the teaching aspirations of supply houses, vendors of dental education, and trade-house journalism.

FOCAL INFECTION THEORY

During this period of retarded growth, the first ray of hope appeared in 1910 with the advent of the Focal Infection Theory. This significant concept was, and is now, an inspirational power in directing the conscience, shaping the ideals, and drafting the pattern of American Dentistry.

In 1918, publication of the classification of the dental schools of this country by the Dental Educational Council of America was a force that invited and created an active interest in the solution of many of dentistry's problems. There appears to be no doubt it was a decidedly potent influence in focusing attention upon the need of a study and survey of dental education.

DR. GIES' REPORT

The new era of improved health hervice dawned with the epochal report on the Study and Survey of Dental Education by Dr. William J. Gies, under the auspices of the Carnegie Foundation for the Advancement of Teaching. It brought golden opportunities and inescapable responsibilities that must be translated into action if we are to see oral medicine acknowledged as a specialty of medical practice, though still retaining its autonomy in health service.

This report was a summons to dentistry to declare its ideals, intentions, principles, theories, and practices, in an effort to reach a status equal in all respects to the status of medicine. It sought to integrate professional courses into a feasible and effective program of professional training. Among other things, it brought a vision of higher serviceability and respectability to medicine and dentistry. It forged a link between the two professions; it united them to solve their interrelated problems; and it cast into oblivion for all time the ghost of past inadequacies. It brought enlightenment and understanding through a recital of pertinent truths, facts, and principles impressively calling attention to the values of the combined health-services of the two professions. It aims to fill the vacancy caused by the absence of the specialty of dental and oral medicine in the practice of conventional medicine. The report is

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equally suggestive to practitioners and teachers of medicine and to practitioners and teachers of dentistry.

MEDICAL-DENTAL RELATIONS

We have already learned the value of reciprocity in medical-dental relations and why it holds a conspicuous position in the mind and conscience of both professions.

Mayo, Hunter, Osler, and others have pointed unmistakably to the pressing need of medical-dental harmony in education, in private and hospital practices, in teaching and research. Without the dynamic influence of an effective medical-dental relations program, would not our effort fail to attain an acceptable oral specialty of health service? And, would not our hopes of promoting a comprehensive health-service program and the continuance of the autonomy of dentistry fade?

From studies and experiences over the years, two needs appear as inseparable as they are indispensable: first, scholastic equality between dentistry and medicine; second, a fully recognized and completely effective medical-dental relationship in education and in private and hospital practices. Obviously, it is neither necessary nor practicable for the physician to become a dentist, nor for the dentist to become a physician. But it is necessary, and therefore should be made practicable, for the two professions to cooperate in education and in practice, since science has shown that they should henceforth consider themselves jointly responsible for drafting and operating a national-in-scope health-service program for the whole man.

PREDENTAL EDUCATION

Aware that education molds our intellectual habits and mental capabilities, dentistry set itself the task of adopting standards in predental education excellence. Its first move was the establishment of a scholastic admission standard equal in all respects to that of medicine. A series of advances in the triumphant march of dental education followed the enforcement of this requisite. As was expected, it proved to be a mighty influence as a foundation in developing the necessary incentive and facility to integrate the principles and teachings of the basic sciences in private practice and in hospital service. As a further consequence many ideals, doctrines, and principles acquired vigorous motive power.

BASIC SCIENCES

In 1926, Dr. Gies' study and survey of dental education revealed that in dental procedures biological advances had not kept pace with the technological. That situation still prevailed in 1944, as set forth by Dr. Horner, in his masterly treatise, "Dental Education Today."

There is urgent need for genuine, sincere effort through better preparation and more active stimulation of interest in the biological phases of dentistry's practices. Obviously, improvement in teaching and practice rests on effective coordination and integration of basic science teachings and clinical teaching, with due regard for the correlations of clinical medicine and dentistry. Heretofore basic scientific education and its integration with clinical practice have taken a backseat, more or less, in some dental schools. However, with the interest and determination of the present day, it appears safe to predict that medical-dental relations will attain a level of usefulness and excellence, equal to that now occupied by technological procedures.

What facts, truths, and principles in basic science teaching and training should dentists possess, and how may they be applied and adapted in practice in order that dentists may work hand in hand with physicians, and reach out for those broader opportunities and higher ideals that lead to the discovery of hidden biological secrets? A book entitled *"Internal Medicine in Dental Practice"*, by Drs. Bernard I. Comroe, Leon H. Collins, Jr., and Martin P. Crane, who are members of the teaching staffs of the Medical and Dental Schools of the University of Pennsylvania, is a monumental contribution to the growth of medical-dental relations. It is designed to give students and practitioners a "speaking knowledge" of modern internal medicine in order that they may be better qualified to consult with physicians and

act in an advisory capacity in dentist-patient relations. May I express the hope that this volume is in the library of every dentist? And may I also hope that the importance of precise observation of signs and symptoms, both within and without the oral cavity will not fail to be recognized by every dentist?

DENTISTRY IN HOSPITALS

The decisive action of the Council on Medical Education and Hospitals of the American Medical Association in advocating the inclusion of dental departments in hospitals throughout the country, the support given that action by the Commonwealth Fund in its Report on Hospital Care in the United States, and the recommendation of the American Dental Association pertaining to residencies and dental internships in hospitals mark a new day of far-reaching interrelations and attainments. Meeting the opportunities and obligations that these inspirational announcements implied, a resistless force was created to expand and stabilize medical-dental relations.

Recognizing the dynamic potential that these pronouncements hold, especially for extended teaching of the basic sciences and application of their principles, many hospitals have taken the opportunity to reorganize and improve their dental departments to equal their medical departments in teaching, research, and service.

How dental service may be coordinated effectively with medical and surgical services and with special fields of practice, special research, and complete utilization of laboratories is a problem to be solved by hospital administrators, their hospital and dental staffs, and state medical and dental societies.

Advances of entrance standards, better teaching, a revised curriculum, promotion of research, and liberation of the dental press, have led to our national goal; the correct interpretation and dutiful performance of dentistry's part in the maintenance of health demands the dentist's unfailing self-reliance.

Devotion to the high ideals and aims of dentistry is a supreme need. Real and permanent welfare of dentistry depends on men whose studies and training have given them a vivid interest in every phase, biological, manipulative, esthetic, of each problem in practice, as well as deepened their sense of responsibility in professional service. Such men can keep dentistry from becoming the handmaid to medicine. May they never fail in the conscientious performance of the honest, intelligent, painstaking, courageous work for which they have been educated. Theirs should be the spirit of the founders of American Dentistry; theirs is the opportunity to rekindle zeal for the profession and to maintain it as a health service in its own right, operating structurally and functionally in accord and in unity with all specialties of medical practice.

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EDUCATION DENTAL E RELATIONES MEDICO-DENTAL

Dr. med. dent. e sc. Albert L. Midgely

SUMMARIO IN INTERLINGUA

Le action decisive que le Consilio de Education Medical e Hospitales del Association Medical American ha prendite in recommendar le inclusion de departimentos dental in hospitales ubique in le Statos Unite; le supporto prestate a ille action per le Fundo del Commonwealth in su reporto in re conditiones de hospitalisation in iste pais, e le recommendation del Association Dental American in re le question de internos dental in le hospitales—omne iste evenimentos initia un nove era de multiple e significative interrelationes e attingimentos. Illos signalava opportunitates e obligationes, e in le interesse de lor promotion e realisation illos creava un irresistibile fortia que tende a expander e stabilisar le relationes medico-dental.

Recognoscente le potentialitates dynamic intra le supra-mentionate declarationes—specialmente con relation al extense inseniamento del scientias fundamental e del application de lor principios—multe hospitales ha usate le opportunitate pro reorganisar e meliorar lor departimentos dental usque a facer los equal a lor departimentos medical in inseniamento, recerca, e servicio public.

Le coordination efficace del servicios dental con servicios medical e chirurgic e etiam con campos special del practica, con interprisas special de recerca, e con le utilisation exhaustive del facilitates laboratorial es un problema que debe esser solvite per le administratores del hospitales in collaboration con lor personal hospitalari e dental e etiam con le societates medical e dental del varie statos.

Plus alte standards de admission, meliorate methodos de instruction, cambiamentos curricular, le promotion del recerca, e le liberation del pressa dental ha assistite nos in attinger nostre objectivos super un plano national. Nunc le correcte interpretation e le conscientiose observation del parte que le dentistas ha in mantener le bon stato de sanitate del publico require que omne dentista individual mantene un sempervive fide in le valor de su profession.

Que nos dedica nos al alte ideales e objectivos del dentisteria es un requirimento supreme. Le ver e permanente ben-esser del dentisteria depende de homines cuje studios e cuje education ha impartite a illes un vive interesse in omne le phases—biologic, manipulative, esthetic—de omne problema del practica dental; illo depende de homines qui possede un profunde senso de responsabilitate e lo manifesta in omne lor servicios professional. Tal homines pote prevenir le transformation del dentisteria in un ancilla del medicina. Nos exprime le alte spero que illes nunquam cessa in le conscientiose execution del honeste, intelligente, exacte, coragiose labor pro le qual illes esseva trainate. In illes le spirito del fundatores del dentisteria american debera superviver. Assi illes habera le opportunitate e le privilegio de reanimar le enthusiasmo pro nostre profession e de mantener lo como un servicio soveran de sanitate public que functiona in harmonia structural e organic con omne specialitates del practica medical.

SIGNS OF PERIODONTAL BREAKDOWN ON PATIENTS WITH MALOCCLUSION — AGE 10-20*

TIMOTHY J. O'LEARY, D.M.D.† and CARLOS E. SOSA, D.D.S.‡

Although references to periodontal disease can be found in the literature dating back several hundred years B.C., it is only in the last forty years that any serious research effort has been made in this field. As our knowledge has increased, some of the time-honored concepts concerning this most complex of disease entities have had to be revised. It is now generally accepted that this is not just a disease of middle or later life but is also found in childhood and adolescence. With the more extensive training now afforded the student in the diagnosis of periodontal disorders, their occurrence in these age groups is being recognized more and more.

A significant amount of research has been conducted on the problem as to epidemiology[1, 2, 3, 4] type of disease process, and causative factors[5, 6, 7] both local and systemic. It is unfortunate, however, that more uniform criteria for diagnosis have not been used as the incidence reported by different investigators varies tremendously. Very few surveys have included roentgenographic examinations in the younger age groups. Marshall-Day[8] states that the failure to include roentgenograms has allowed the presence of early periodontal breakdown to remain unrecognized and unreported. Among the many local causative factors mentioned in the etiology of periodontal disease is malocclusion. Clinically, we have all seen many cases of young adults with malocclusion and advanced alveolar bone destruction. In a good percentage of these cases, because of the paucity of other detectable local and systemic etiologic agents, we cannot help but wonder whether the malrelationship of the teeth and/or arches was not the inciting agent. However, very little clinical research has actually been done on this subject.

This study has been undertaken to determine whether roentgenographic signs of incipient and actual periodontal destruction could be found in clinically healthy young people with malocclusion. Because of limitations of personnel and time this is intended only as a pilot study which may at best indicate trends. Due to the above limitations, alveolar bone loss, loss of the normal lamina dura and widening of the periodontal membrane were not charted as to root surface or area involved but were recorded only as to the teeth involved.

REVIEW OF THE LITERATURE

There are many references in the literature dealing with malocclusion of the teeth and its effect on the periodontal structures. Miller[9] states that malocclusion may be a definite factor in the production of periodontal disease. He is of the belief that non-occlusion, distocclusion and mesiocclusion may all cause gingivitis, alveolar resorption and gingival atrophy in older children. McCall[10] believes there is general agreement that malocclusion may lead to traumatic occlusion. He has found evidence of a disturbance in children due to traumatic occlusion which does not always involve the gingival tissues. It is a slight alveolar resorption affecting the entire alveolar wall to a uniform extent and viewed on the roentgenogram as a thickening of the periodontal membrane. It is his belief that the periodontal membrane thickening is the foundation for a severe periodontoclasia found later in life. Dummett[11] states that an irregular alignment of the teeth may be the initiating cause of periodontal disease in a significantly large number of cases. However, he looks at it from the point of view of food retention with resultant impairment of the blood circulation to the tissue. Thomas[12] lists a number of factors as responsible for periodon-

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tal disturbances in the young patient. Among them are trauma and malocclusion. Unless definitive treatment is carried out in childhood, he believes the damage may continue into the adult period to play an important part in the development of pyorrhea alveolaris. Zappler[13] states that in her own experience traumatic occlusion was frequently found in crowded lower teeth. Characteristic findings in these cases were atrophy of the gingiva and sometimes of the alveolus as seen by roentgenographic examination. Neustadt[14] believes that malpositions of the teeth are the commonest cause of occlusal-incoordination. Included are the horizontal malpositions, mesial-distal, labial-lingual and rotations. He states they cause traumatogenic (traumatic) occlusion by taking the cusps of the teeth out of their normal occlusal relationship. Cuspal interference is produced by slight horizontal malpositions.

Box[15] has defined an occlusion, which under biting pressure, produces an injury in the periodontal tissues as traumatogenic occlusion. In this regard he states that excessive magnitude of the occlusal force is combined with excessive angle of contact in the majority of severe forms. Testing mobility in different sheep of approximately the same age, Box[16] has found that in general, the lower anterior teeth under axial loading were tighter than those under oblique loading. Where the two classes of loading were evident in individual sheep, teeth obliquely loaded were significantly looser than the ones axially loaded. Pericementitis Fibrosa is the term used by Box[17] to describe the histopathologic changes in the periodontal membrane. The normal bundle arrangement of the periodontal tissues is replaced by a fibrillar connective tissue which also replaces the bone substance of the alveolar process.

Coolidge[18] has correlated abnormal or excessive functional stress with resultant areas of pressure resorption in the alveolar bone on opposite sides of the root at the cervical and apical area. He found that these injuries in the periodontal tissues of human teeth appear to heal readily when the abnormal or excessive stress is relieved. However, if the reparative power of the tissue is overtaxed by repeated insults over long periods, the unrepaired damage might lead to periodontal disease.

Kronfeld and Weinmann[19] have reported on a study of traumatic injuries in the periodontium of six deciduous dentitions ranging in age from 9 months to 4½ years. The injuries ranged in severity from a compression ischemia and hyalinization of the periodontal connective tissue to a crushing and necrosis of periodontal tissues and formation of hemorrhagic cysts. In most instances, the injuries were followed by undermining bone resorption and evidence of tissue repair. They believe the etiology of these injuries is probably the weakness of the periodontal membrane of erupting and newly erupted teeth, and in older jaws an additional factor is weakening of the periodontal support caused by shedding of the deciduous teeth.

CLINICAL MATERIAL AND CRITERIA USED IN THE EVALUATION

Pre-treatment roentgenograms and casts of patients aged 10-20 years in the Orthodontia Department of New York University were studied in this project. In order to standardize results as much as possible, certain criteria for selection of cases was employed. No case was included where deciduous teeth were still present or where any of the permanent teeth had been lost or showed carious lesions. Only those teeth whose apices were completely closed as seen roentgenographically were evaluated. To be included, teeth had to be at the level of the occlusal plane or as far occlusally as the existing malocclusion would permit. Signs of periodontal pathosis were recorded only if they could be viewed on at least two different roentgenographic views.

Criteria employed for determination of alveolar bone loss was absence of a normal lamina dura plus an irregular crestal outline accompanied by a reduced height of the alveolar bone in relation to other fully formed and erupted teeth. The lamina dura was recorded as being absent when it could not be viewed at the crestal area in at least two different roentgenograms of the same area. Widening of the periodontal membrane space was recorded when thickening, clearly abnormal, in comparison to

the periodontal membrane space of other fully formed and erupted teeth of the same individual, was demonstrable.

The following data was secured on each case; 1) Age, 2) Sex, 3) Classification of malocclusion (Angle), 4) Arch form, 5) Palate form, 6) Relationship between size of upper and lower arch, 7) Non-occlusion of teeth, 8) Alveolar crest loss, 9) Absence of lamina dura, 10) Shape of alveolar crest, 11) Crown shape, 12) Periodontal membrane space, 13) Root shape.

In order to correctly interpret deviations from the normal in the roentgenographic appearance of the supporting structures, it is first necessary to have an understanding of what is normal for different periods of life. Ritchey and Orban[20] have furnished us with a description, both histologic and roentgenographic, of the periodontium, normal variations and its appearance in the presence of occlusal disharmonies.

The shape of the teeth influences the shape of the interdental septa and crests. If approximating tooth surfaces are relatively flat, the septa will be narrow with a tapering crest. With markedly convex contours on the mesial and distal surfaces of teeth, we may expect to find a relatively wide interdental septa with a flat crest.

Crown length is another variable determining the position of the alveolar crest. The crest will slant upward from the cemento-enamel junction of a long crown to the cemento-enamel junction of a shorter crown. The degree of eruption of the teeth must be considered in determining whether a radiographic view is normal or pathologic. In undereruption the alveolar crest will slant up from the cemento-enamel junction of the erupting tooth. In cases where a tooth has lost its antagonist, and consequently overerupted, the bony crest will assume a new outline, and radiographically it will appear to slant obliquely downward to the cemento-enamel junctions of the approximating teeth with occlusal antagonists.

The inclination of the teeth in the jaws is another variable. The inclination results in the cemento-enamel junctions of the mesial and distal surfaces being at different levels with a consequent slanting of the bony crests. The degree of inclination of the teeth from the vertical determines the inclination of the alveolar crests. From the above, we can see that the position of the cemento-enamel junction is the main determinant of the position of the alveolar crest. These variations are all confirmed by histologic material.

Roentgenographically occlusal trauma first appears as a widening of the periodontal membrane surrounding the apex. If the trauma continues over a considerable period of time, the periodontal membrane may become widened in its entirety and will appear so on the roentgenogram. Clinically, this is significant as we know that occlusal trauma will cause tooth mobility. However, teeth may become very mobile and still show very little or no alveolar crest loss.

Angle's classification of malocclusion[21] was used in this study because of its almost universal acceptance. For reasons of simplicity, Class I was not broken down into types and Class II was broken down only into Division I and Divisin II.

FINDINGS

The pre-treatment casts and radiographs of 94 patients, with malocclusion, ranging in age from 10-20 years, were studied. Bone loss was found in 24 of the 94 cases studied or in 25.5%. For the entire group, bone loss was found in 21.7% of females and 29.1% of the males. Loss of a normal lamina dura was observed in 34 of the 94 cases or 36.1%. Widening of the normal periodontal membrane space was seen in 72 out of the 94 patients or 76.6%.

Table I gives a breakdown of these figures according to type of malocclusion, sex and age incidence. Three of 22 Class I females or 13.6% showed bone loss; 9 of 22 Class I females or 40.9% showed loss of a normal lamina dura while 17 of the 22 or 77.2% showed a widening of the normal periodontal membrane space. Of 15 males in Class I, 7 or 46.6% showed both bone loss and loss of a normal lamina dura while 12 or 80% showed a widening of the normal periodontal membrane space.

Of 18 Class II Division I females, 6 or 33.3%

FINDINGS

TABLE I—Periodontal breakdown according to type of malocclusion, sex and age incidence.

	Class I		Class II Division I		Class II Division II		Class III	
	Female	Male	Female	Male	Female	Male	Female	Male
Number in Class	22	15	18	23	5	9	1	1
Alveolar Crest Loss	3	7	6	5	1	2	0	0
Lamina Dura Loss	9	7	7	7	2	2	0	0
Periodontal Membrane Widening	17	12	14	15	5	9	0	1

Class I — Female
- 13.2 Average Age
- 13 Average Age Bone Loss
- 13.2 Average Age Lamina Dura Loss
- 13.2 Average Age Periodontal Membrane Widening

Class I — Male
- 14.6 Average Age
- 14.9 Average Age Bone Loss
- 14.9 Average Age Lamina Dura Loss
- 14.8 Average Age Periodontal Membrane Widening

Class II Division I — Female
- 12.8 Average Age
- 13 Average Age Bone Loss
- 13.2 Average Age Lamina Dura Loss
- 12.8 Average Age Periodontal Membrane Widening

Class II Division I — Male
- 13.9 Average Age
- 15.4 Average Age Bone Loss
- 15.6 Average Age Lamina Dura Loss
- 14.5 Average Age Periodontal Membrane Widening

showed bone loss; 7 or 38.8% revealed loss of a normal lamina dura while 14 or 77.7% showed widening of the periodontal membrane space. Of 23 Class II Division I males, 5 or 21.7% showed alveolar bone loss; 7 or 30.4% showed loss of a normal lamina dura while 15 or 65.2% showed widening of the periodontal membrane space.

Statistical information was not obtained for Class II, Division II or Class III cases as a large enough group for statistical validity could not be found meeting our selection criteria.

DISCUSSION

In many of these cases aberration from the orthodontic norm was marked and the occlusal contact relationships far from compatible with the accepted viewpoint of an occlusion favorable to periodontal health. No significant correlation could be found between arch form, palate form, relationship between size of upper and lower arches and signs of incipient and actual periodontal breakdown. For purposes of simplicity and clarity the findings in respect to non-occlusion of teeth will be reported in a separate paper.

Generally, it may be said that bone loss, if present, was most severe around the lower first molars and next in decreasing severity the central incisors. In cases of widening of the periodontal membrane space, the severity was most pronounced around the first molars and in Class II, Division II cases, the upper central incisors. An interesting sidelight is that very often pronounced facet formation on the first molars could be correlated with roentgenographic evidence of periodontal membrane thickening.

At this point some pertinent questions should be considered. Are these signs of periodontal breakdown in the first molar region only transitory and due to the great amount of stress placed on these teeth during the period of the transitional dentition? Are the changes observed in the cuspid and bicuspid areas due to accelerated eruption of these teeth exposing underdeveloped root and periodontal membrane

tissue to occlusal stress? We know from the research of Kronfeld and Weinmann[19] that repair of this tissue is possible if the insulting agent is removed and the environment favorable. Indeed, if 76.6% of the cases evaluated showed a widening of the normal periodontal membrane space, are we to say this is a sign of periodontal disease? Or is it rather a physiologic reaction to stress in the periodontium which will resolve itself in time,

Therefore, we must consider certain other pertinent factors. A great number of the cases evaluated were in the 12-15 year old group when a sudden increase in gonadal hormone activity may upset the delicate balance of the endocrine glands and induce metabolic changes. There is no doubt that accompanying these increased gonadal secretions we also have psychic disturbances that influence the periodontium as well as the rest of the body.

Miller, Seidler and Wolf[22] have reported on a series of cases of advanced periodontal disease in young patients which they have termed Precocious Advanced Alveolar Atrophy. In these cases local causes were not severe enough to produce the existing tissue destruction. The onset of the disease appeared to be about puberty (13 years) or in males a little later. Eighty per cent of the patients appeared to have an excessive carbohydrate consumption. They believe that the primary etiologic agent is systemic in nature.

In any discussion of periodontal pathosis, it would be amiss to neglect mentioning other influencing factors such as calculus, habits, oral hygiene, nutritional factors, etc. The Etiologic Chart of S. C. Miller[23] serves to remind us that in all probability, periodontal disease is produced by a number of agents working simultaneously and not by single causation.

SUMMARY

Ninety-four cases of malocclusion were studied by means of pre-treatment casts and roentgenograms. The amount of periodontal disturbance seen may possibly indicate a predisposition to alveolar resorption in cases of malocclusion with its concomitant occlusal derangements.

It is not expected that these findings will be accepted widely because of the great divergence of opinion on what is normal and abnormal in the periodontium. However, it is hoped that this paper will stimulate further work on this problem with its many ramifications. Several lines of investigation would prove of value; one would be to determine the sites of alveolar bone loss, lamina dura absence and widening of the periodontal membrane on the root surfaces in relation to each type of clinical malocclusion.

Another project would entail following a series of these cases in patients (10-20 year old group) over a period of years with clinical and roentgenographic examinations at stated intervals to determine whether repair or further disintegration would occur. A third worthwhile investigation would be to record the pre-treatment findings on a series of youthful patients (age 10-20 years) and then, after appropriate orthodontic treatment, re-examine the patients at suitable intervals to see if the periodontal breakdown had been repaired.

This investigation has served to re-emphasize the close inter-relationship between the fields of Periodontia and Orthodontia. Only through close cooperation and concerted effort between these two specialties will the initiation and progression of many cases of masticatory breakdown in later life be prevented.

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SIGNOS DE COLLAPSO PERIODONTAL IN PATIENTES CON MALOCCLUSION, DE ETATES DE INTER 10 E 20 ANNOS

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SUMMARIO IN INTERLINGUA

Un serie de 94 casos de malocclusion in juveniles inter 10 e 20 annos de etate esseva studiate per medio de modulos e radiogrammas pre-tractamental pro determinar le presentia (o absentia) de signos de collapso periodontal. Le typo de malocclusion esseva determinate super le base de modulos per medio del classification de Angle. Le roentgenogrammas esseva studiate pro (1) perdita de osso alveolar, (2) perdita de lamina dur, e (3) allargamento del spatio del membrana periodontal.

Perdita de osso alveolar esseva constatate in 24 ex 94 casos, i.e. in 25,5 pro cento. Perdita de osso esseva constatate in 21,7 pro cento del pueras studiate e in 29,1 pro cento del pueros. Perdita de un normal lamina dur esseva notate in 34 ex le 94 casos studiate, i.e. in 36,1 pro cento. Allargamento del normal spatio del membrana periodontal esseva observate in 72 ex le 94 patientes, i.e. in 76,6 pro cento.

Post classificar le casos secundo sexo e typo de malocclusion il resultava que: 3 ex 22 pueras de ClasseI, i.e. 13,6 pro cento, habeva perdite de osso; 9 ex 22 pueras de classe I, i.e. 40,9 pro cento, habeva perdita del normal lamina dur circa un o plure dentes; 17 ex 22 pueras de Classe I, i.e. 77,2 pro cento, habeva allargamento del normal spatio del membrana periodontal. Ex 15 pueros de Classe I, 7 (o 46,6 pro cento) monstrava perdita de osso e perdita de normal laminas dur, durante que 12 (o 80 pro cento) monstrava un allargamento del spatio del membrana periodontal.

Ex 23 pueros del Division I del Classe II, 5 (o 21,7 pro cento) monstrava un perdita de osso alveolar; 7 (o 30,4 pro cento) monstrava perdita de un normal lamina dur, durante que 15 (o 65,2 pro cento) monstrava allargamento del spatio del membrana periodontal.

Information statistic pro le Division II del Classe II e pro le Classe III non esseva obtenite proque il non esseva possibile trovar un statisticamente significative numero de casos satisfacente nostre criterios pro iste gruppos.

Nos discute nostre resultatos ab le puncto de vista de causation multiple, con referentia non solmente a disharmonia occlusional sed a multe possibile agentes etiologic.

CHEMOTHERAPEUTIC APPROACH IN ENDODONTICS*

ALEX DININ, B.S. D.D.S.†

Before discussing the chemotherapeutic treatment of root canals, it is better to briefly consider our aim in treating a pulp-involved tooth. Chiefly it is to maintain the tooth in a useful, healthy state, and to keep the supporting tissues in a normal condition. Furthermore, if pathology exists, we strive to bring about a state of health.

How do we know whether or not we were successful in our efforts? The following are the criteria:

1. Clinical examination: absence of pain, swelling, fistulous tract, tenderness, etc.

2. Radiographic examination: if, when treatment is started, a radiolucent periapical area is present, it fills in with normal bone several months to a year after treatment. In our clinic, completed cases are checked at six month intervals. We find that the most common cause of failure is poor condensation of root canal fillings.

The New Gould Medical Dictionary defines chemotherapy as "prevention or treatment of infectious diseases by chemicals which act as antiseptics within the body, without producing serious toxic effects." Stedman's Medical Dictionary defines chemotherapy as "Treatment of infectious diseases by means of chemical substances or drugs." In other words, these agents are intended to fight infection by being carried in the blood stream. Their primary use is systemic.

In endodontics, when clinical signs of infection are present, as evidenced by pain, swelling, tenderness, etc., antibiotics administered orally or by intramuscular injection are very effective. This, of course, is coupled with opening of the involved tooth, and when necessary, incising for drainage. These acute "flare-ups" occur rather frequently if infected material is pushed through the apical foramen as may be done if the entire non-vital pulp is removed during the first visit of endodontic treatment. Incidentally, this procedure is recommended when antibiotic pastes are to be used as dressings in root canals.

CHEMOTHERAPEUTIC DRUGS

Chemotherapeutic drugs as commonly used during endodontic treatment are intended to sterilize the root canal prior to filling. Many such drugs were utilized and many methods for their use have been described. Some of the earlier methods were: a. irrigating the canal with solutions of drugs, b. a paper point which had been soaked in solution allowed to dry and inserted as a dressing between visits, c. powdered antibiotic picked up on a point which had been moistened with water or other liquids, and many more.

If our discussion is limited to those drugs which inhibit the growth of bacteria by interfering with their metabolism thus reducing their number to such an extent that the invaded host may fight off the inflammation, we must begin with the rather recent use of the sulpha group.

Sulphanilamide, the active ingredient of prontosil, was probably the first chemotherapeutic agent tried. Adams, in 1943, recommended a hot solution of this drug be used as a flush in root canals, preferably through the canal and out through an opening in the periapical area into the mucobuccal fold.[1]

Later, sulphadiazine, sulphametazine and sulphathiazole were tried. The antibiotics which followed replaced the sulpha group of drugs, being less toxic and having fewer side reaction. Thus it was very natural for the dentist to use these new drugs in root canals. Again the literature carried articles showing the well familiar agar plate with zones of inhibition around a paper point dipped in penicillin.

The then new aureomycin combined with formocresol was tried at our clinic, and the

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zones of inhibition on an agar plate were larger than those of either drug alone. A study was made of spectrocin, the plates again were impressive. Clinically, however, none proved better than formocresol, camphorated monochlorphenol or eugenol.

It was soon discovered that the antibiotics were highly selective in action, their spectrum of activity very limited. Also, they were not very stable in solution, were deactivated by acids, alkalies, metallic salts and by oxidizers. As new antibiotics were developed they were quickly combined and used in endodontics. Bender and Seltzer advocate the use of streptomycin and chloramphenicol in propylene glycol.[2] Stewart introduced a combination of perazil (an antihistamine) penicillin, chloromycetin and propylene glycol in neobase or xylocaine ointment.[3] The most popular paste, of course, is Grossman's PBSC. This consists of penicillin, bacitracin, streptomycin and sodium caprilate in a silicone base.[4]

APPLICATION OF DRUG

To be most effective, a drug has to be in sufficient concentration and in contact with the infecting organism. To accomplish this it is recommended that on the first visit, the tooth be opened, the entire pulp tissue removed, the canal reamed so that a 23 gauge needle will go into the canal and the paste forced in. A paper point is pushed in and the canal sealed with cement. The acute reactions which are very common, are treated with systemic chemotherapy. Clinically we find that these severe reactions are very infrequent if a non-vital pulp is not removed in its entirety during the first visit of treatment.

Just what does endodontic treatment imply? Organic tissue has to be removed, the canal has to be mechanically cleaned and widened so that it will receive a well condensed filling. The canal has to be sterile, and the patient should be in complete comfort. Asepsis must be practiced at all times. It has been found that with careful, conventional treatment, using simple, stable drugs such as eugenol, formocresol, camphorated monochlorphenol, most of the cases are sterile after one or two treatments. The most time consuming procedures during treatment are the mechanical steps necessary in good endodontic treatment.

Bender and Seltzer made a study of the probability of error of the negative cultures when combinations of antibiotics are used in endodontic treatment. They found that small traces of antibiotics carried from the canal into the culture tube inhibit growth of bacteria causing a false negative result. After a well controlled study they conclude that, "paper points from antibiotic-treated root canals can transfer antibacterial activity to the culture tube and produce false negative cultures." Also, "cultures from root canals which had been treated with antibiotics must be incubated for at least one week. If 24 or 48 hour periods of incubation were used, the percentage of false negatives would be 31%, as compared with 13%, after seven days."[5]

Radiographs showing radiolucent periapical areas fill in with bone several months after successful endodontic treatment are very common. For many years it had been suspected that when irritation to the periapical area is removed, and further irritation prevented by placing in the canal a well condensed filling, the area will return to normal.

Wilfred Fish[6] attempts to explain some of these periapical lesions. He divides the periapical area of inflammation into four zones. Around the apex of the tooth is the zone of infection. This is where the polymorphoneuclear leukocytes predominate. Over this is the zone of contamination which is the zone of round cell infiltration. Next is the zone of irritation where osteoclasts predominate. Finally is the zone of stimulation where fibroblasts and osteoblasts are found. There are no osteoclasts in this outer zone.[6] The entire area is therefore an area of defense, and unless a true cyst is present, the area will clear up after the root canal is cleaned and filled properly.

PRESENCE OF INFECTION

Since chemotherapy as commonly used in endodontics places the entire emphasis on infection present in root canals and periapical tissues, an important study was made by War-

ren J. Hedman. He wanted to determine whether or not bacteria are still present in the periapical areas after completed pulp canal treatment. Previous studies of periapical areas were done after the teeth were extracted. Blaney and others have found that it is almost impossible to avoid contamination during extraction. Hedman devised a method where a cannula was passed through the canals of rubber-dam-isolated teeth into the periapical areas and a culture wire was passed through the cannula. Radiographs were made to show the culture wire in the area. After two negative cultures in the root canal were obtained prior to filling the canal the periapical area was again cultured. After filling the canal the areas were removed and histopathologic studies made. All the 56 infected cases so studied showed no periapical infection after the canals were negative. Histopathologically only five cases were diagnosed as radicular cysts, fifty-one were chronic periapical granulomas. He draws the following conclusion, "it appears that after complete pulp canal therapy, in which negative cultures are obtained, the infection in the apical tissue is resolved without demonstrable residual infection."[7]

Most endodontists believe that it is desirable to rotate drugs used in root canals whenever one particular drug is not too effective in a given case. Antibiotic pastes may be used as one more aid in our treatment. Thus if one adheres to all the accepted mechanical procedures in endodontics such as access, instrumentation, careful medication, filling, coupled with thorough asepsis and selection of cases, chemotherapy has a place in endodontics. But, if one relies in antibiotics as a quick method to get a negative culture and save all teeth, failure is inevitable.

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ENDODONTICA CHIMOTHERAPEUTIC

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SUMMARIO IN INTERLINGUA

Ante discuter le tractamento chimotherapeutic del canales de radice, il pare bon revider brevemente nostre objectivos in tractar un dente a pulpa involvite. Principalmente nos visa a mantener le dente in stato de bon sanitate e utilitate e a reinfortiar le texitos in condition normal. In plus, si un stato pathologic es presente, nos visa a reimplaciar lo per un stato de sanitate.

Como pote nos saper si o non nos ha succedite in nostre effortios? In le sequente passage le major criterios del responsa es listate:

1. Examine clinic: Absentia de dolor, de turgescentia, de signos de un tracto fistulose, de sensibilitate sub pression, etc.

2. Examine radiographic: Si al comenciamento del tractamento un radiodiaphane area periapical es presente, illo se replena de osso normal intra un periodo de inter plure menses e un anno post le tractamento. In nostre clinica, casos completate es re-examinate a intervallos de 6 menses. Nos ha trovate que le plus frequente causa de nonsuccesso es imperfecte condensation del materia inserite a in le canal del radice.

Quando, del puncto de vista endodontic, signos clinic de infection es presente—manifeste per le presentia de dolor, turgescentia, sensibilitate a pression, etc.—antibioticos administrate oral- o intramuscularmente es multo efficace. Iste tractamento es naturalmente combinate con aperimento del dente involvite e, si necessari, con incision pro effectuar drainage. Acute "crises" del typo sub discussion occurre satis frequentemente si materia inficite es fortiate a transverso le foramine apical, lo que eveni facilemente si le integre portion non-vital del pulpa es obliterate al prime visita del patiente requirente tractamento endodontic. A proposito, iste procedimento es a recommendar si pastas antibiotic es usate como application intra canales de radice.

Pro esser vermente efficace le droga debe esser sufficientemente concentrate e in contacto con le organismo causative del infection. Pro attinger iste objectivo il es recommendate que al prime visita del patiente le dente es aperite, le complete massa del pulpa es obliterate, le canal es allargate de maniera que un agulia de calibre numero 23 pote passar a in le canal, e le pasta es fortiate a in le canal. Un puncta de papiro es inserite, e le canal es claudite con cemento. Le acute reactiones, que es multo commun, es tractate per chimotherapia systemic. Del puncto de vista clinic nos trova que iste sever reactiones deveni infrequentissime si le pulpa non-vital es non integremente obliterate durante le prime visita del patiente.

Le majoritate del endodontistas crede que le uso alternante de plure drogas es desirabile quandocunque in un caso specific le prime droga tentate es non nimis efficace. Pastas antibiotic pote esser usate como adjuta additional in nostre tractamento. Assi, si le endodontista exploita omne le acceptate procedimentos mechanic—i.e. in obtener accesso al canal de radice, in instrumentation, medication, replenamento—insimul con plen asepsis e caute selection del casos, chimotherapia ha un importante function in le practica endodontic. Sed si le endodontista expecta que le uso del antibioticos es un rapide methodo pro obtener culturas negative e pro salvar omne dentes, alora fallimento es inevitabile.

Case Report

AN INTERESTING CASE OF ORTHODONTIC — PERIODONTIC TREATMENT

SIDNEY SORRIN, D.D.S., F.A.C.D., F.A.D.M., F.A.A.A.S.*

There are many cases in which there is need for cooperation between orthodontist and periodontist to secure best results.[1,2,3,4] The case report which follows, however, is one in which orthodontic therapy reached the point where it could not further improve the case and periodontic treatment was instituted.

The case was begun by a well known specialist, Dr. D., in 1925 when the patient was 17 years of age. Treatment was stopped in 1928 at the age of 20 and considered a failure. It was a mesio-occlusion case and although some improvement was noted, both patient and orthodontist agreed that it was a failure, and the worst was expected in the very near future. In 1935, ten years after the beginning of orthodontic treatment, the patient was referred to the writer for some assistance.

The case (Fig. 1) presented a male, 27 years of age, with marked pus pocket formation, moderate to marked mobility of most of the teeth, bleeding at the slightest provocation, pain in the gingivae, traumatic occlusion, food impaction, venous congestion, recession, incorrect method of toothbrushing, and severe gritting and grinding habits. The patient was upset in view of the prospects of losing his teeth.

The roentgenographic series (Fig. 2) indicates the severity of bone loss and root resorption due to orthodontic therapy. Some teeth required extraction because of trifurcation, bifurcation involvements and marked mobility.

Treatment was instituted immediately. This consisted of the following:—

1. Equilibration of the occlusion as well as could be accomplished (none had been done).
2. Institution of curettage throughout the mouth.

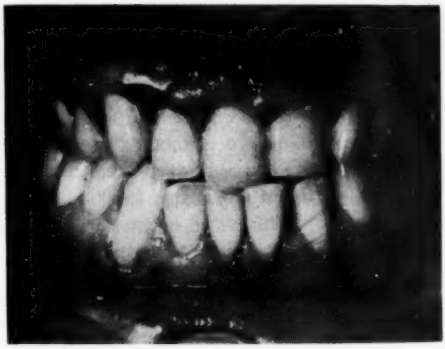

Fig. 1. Prior to treatment.

3. Instruction in Stillman method of gingival massage.
4. Check on diet.
5. Elimination of food impaction areas.
6. Elimination of grinding and tongue habits.
7. Consultation with patient's dentist as to extractions and reconstruction of the mouth.

The case was completed in 1936 and since that time the patient has visited the office regularly for maintenance care three times a year.

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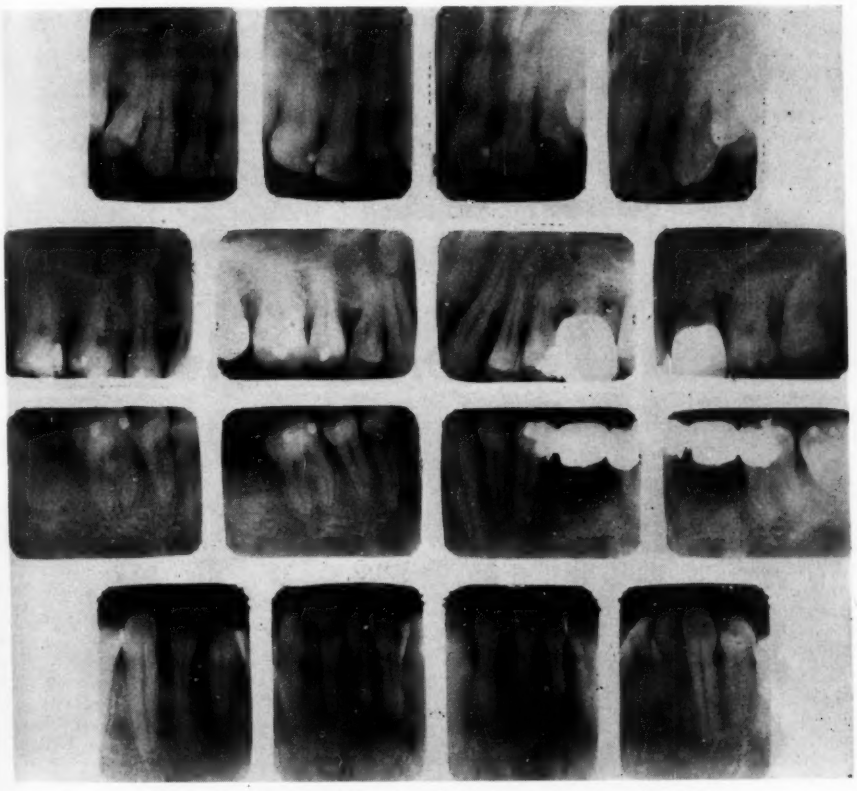

Fig. 2. Roentgenographic series taken prior to treatment in 1935.

It is 20 years since Mr. P. first came for treatment and he is now 47 years of age (Fig. 3). All the teeth which were retained and treated are still present in the mouth and functioning very well.

A comparison of the roentgenographs (Fig. 4) over a period of 20 years is most interesting. Note that bone loss was checked and pockets were eliminated. The teeth became firm and the restorations have not been replaced in 20 years since dental and periodontal treatment was completed. Note that the upper left molars are splinted.

Fig. 3. Twenty years after treatment. All teeth which were retained and treated are still present in the mouth and functioning very well.

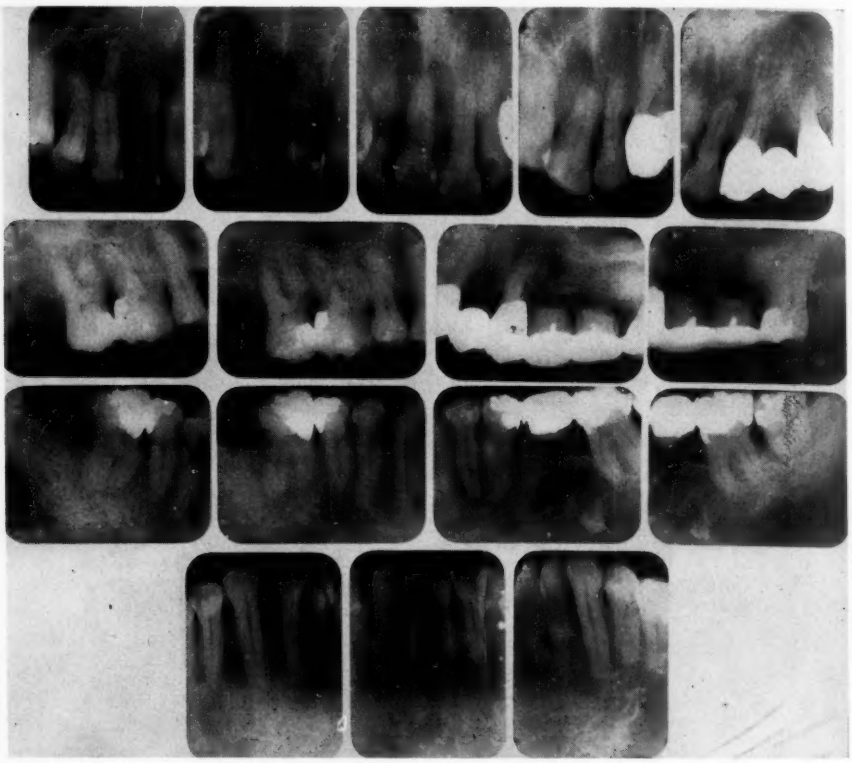

Fig. 4. Roentgenographic series taken this year. The time between Fig. 2 and Fig. 4 is twenty years.

DISCUSSION

Much good can be accomplished by the cooperation between the orthodontist, periodontist and general practitioner of dentistry. The prognostication as to future dental health is excellent. Mr. P. is not only delighted that he has been aided but has developed a greater respect for the dental profession.

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Medical Views on Oral Problems

PEMPHIGUS*

TO THE EDITOR:—*My patient has pemphigus. I would like to know the tests used to make a definite diagnosis. What is the latest treatment and final outcome? I have always been taught it was fatal.*

Louise M. Pugliss, M.D., Brooklyn, N. Y.

ANSWER.—The diagnosis of pemphigus can be established by histological examination. The characteristic lesion consists of a degeneration of epidermal cells leading to a loss of coherence between the epidermal cells (acantholysis) and thus to the formation of intraepidermal blisters. It is important that only very early blisters be selected for histological examination; otherwise, secondary changes obscure the characteristic changes. There are two major types of pemphigus, pemphigus vulgaris and pemphigus foliaceus. Prior to the advent of corticotropin (ACTH) and cortisone, pemphigus vulgaris nearly always was fatal, while pemphigus foliaceus had a better prognosis, especially in patients under 60 years of age, of whom more than half survived.

The only effective treatment for pemphigus is corticotropin or cortisone. Pemphigus always responds to these agents, but large doses usually are required for the adequate control of the disease. Because large doses have to be administered for long periods of time, side-reactions are common. Therefore, the treatment of pemphigus should be carried out only by someone thoroughly familiar with the disease as well as with the administration of the steroids. Corticotropin or cortisone usually must be given over several years, either continuously or, if possible, in intermittent courses. It seems that after a period of one to several years pemphigus vulgaris and pemphigus foliaceus gradually become inactive and the patient remains well without further treatment. Thus, the steroids appear to be lifesaving drugs in pemphigus. The greatest danger to the life of the patient nowadays lies in possibly fatal complications to the therapy with corticotropin or cortisone.

* Queries and Minor Notes, J.A.M.A., June 11, 1955, p. 521.

HAZARD OF ANTICOAGULANTS*

In a series of 2,000 patients treated with coumarin anticoagulants for periods varying from 1 month to 9 years, hemorrhagic complications of varying severity occurred in 5 per cent, reports Dr. Charles E. Brambel (Mercy Hospital). The major complications encountered were purpuric areas on the extremities appearing spontaneously without trauma, bleeding from nose and gums, hematuria and rectal bleeding. One in a hundred of those receiving anticoagulants required interruption of therapy and vitamin K_1 intravenously to counteract the bleeding tendency. Extravasation of blood was not directly related to the dosage of anticoagulants, the degree of inhibition of blood clotting or the duration of therapy.

* Reported at the Conference on Bioflavonoids and the Capillary, New York Academy of Sciences.

WASTAGE OF VITAMINS*

TO THE EDITOR:—*What is the possibilty of waste by urinary excretion following the parenteral use of Vitamin B complex and also intravenous use of Vitamin C? This information is desired in connection with the fairly routine use of these vitamins in the preoperative and postoperative period.*

M.D., Iowa.

ANSWER:—The water-soluble vitamins are not stored in the body and are low-threshold substances; if they are present in excess of immediate body need, excretion results. Vitamin C is important in wound healing and is needed in adrenal metabolism, but there is no evidence that its administration in patients not deficient is of any value. On the other hand, patients on a diet for ulcers quickly become Vitamin C deficient, and older people who do not eat a rounded diet also tend toward deficiency. B complex has many functions, one of which concerns metabolism in nerve tissue. Administration of B complex in large doses sometimes benefits pain of causalgic type but in patients on normal diet does not apparently speed nerve lesion healing. Here again, patients who are Vitamin C deficient also tend to be deficient in B complex. Postoperatively, in nondepleted patients who can eat, vitamins are not needed. In patients who will have gastric suction for three to four days, replacement is not needed. In patients who have been depleted but have been restored preoperatively, postoperative administration is not necessary in the first three to four days. It probably is safe to say that vitamins are as much overused as the antibiotics, and it is very difficult to prove that substances used "prophylactically" have been of specific benefit.

* Queries and Minor Notes, J.A.M.A., June 4, 1955, p. 440.

FLUORIDATION AND DENTAL DECAY*

After the announcement that public drinking water would be subjected to fluoridation in four districts, Drs. Dagmar Wilson and Hugh Sinclair, of the department of human nutrition, Oxford, have raised objections. They state that too little is known of the

effect on the human body of the chronic ingestion of low concentrations of fluoride and of the level of intake at which retention in the body occurs in different people. Although it has been demonstrated without doubt that fluoride decreases the incidence of dental caries in children up to the age of 8 years, the effect on adults is less certain, they say. They argue that the fact that 14 million people in the United States are drinking water fluoridated to 1 ppm, without any demonstrable ill effects, proves nothing because dietary conditions differ in the two countries. In Britain large quantities of tea and sea food, both rich in fluorides, are consumed; these foods are unlikely to be used as much in the United States. They also argue that the excretion of fluorides is not known in old people, whose intake of tea and hence fluoride is usually high. They find some evidence that fluorides are not excreted readily and accumulate in the body. If this is so, they argue, accumulation may occur in the body of elderly persons and in those persons with impaired renal function. Whether this accumulation is harmful or not is not known. Atmospheric pollution with fluoride has caused outbreaks of illness in sheep and cattle. Although not objecting in principle to the fluoridation of drinking water, they urge that more research should be done, particularly on fluoride storage and excretion and its mode of action in preventing dental decay.

* Foreign Letters, J.A.M.A., March 26, 1955, p. 1150.

DENTAL CARIES*

A survey on the incidence of dental caries in children has been made by Dr. Geoffrey Slack at the University of Liverpool School of Dental Surgery. The condition of the teeth of nearly 2,000 children under age 5 attending day nurseries was noted over a period of four years. These children received good food, including a liberal supply of vegetables, cod liver oil, orange juice, and one pint of milk a day. No candy or snacks were allowed between meals at the nurseries, although there was no check on the food consumed at home. When present, caries was classified as: grade 1, cavities admitting the point of a dental probe; grade 2, cavities involving up to a third of the crown of the tooth; and grade 3, cavities involving more than a third of the crown. All fillings were recorded as cavities. The condition of the gums was noted and gingivitis classified as grade 1, 2, or 3.

The incidence of caries in the children was high. On reaching 5 years of age, the children had an average of five decayed teeth. In the first year the incidence was 10 to 20%, but it reached a maximum in the fifth year, when about 82% of the children had an average of 4 or 5 teeth decayed, extracted, or filled. The school dental service, which is chronically understaffed owing to the low salaries paid, is thus faced with a problem of great magnitude. Twenty-six full-time dentists would be required in Liverpool alone to treat the teeth of all the children aged 4 to 5. Actually there are only 24 dentists to treat all the school children of Liverpool, and it is assumed that a similar situation exists elsewhere. The consequence is that many children become dental cripples. The solution does not lie solely in increasing the number of dentists, but in finding the cause of dental caries. There was an increase in the incidence of caries in one of the years of the study, and Dr. Slack attributes this to an increased consumption of candy, which ceased to be rationed after ten years. Three measures are recommended for reducing the incidence of caries: the fluoridation of drinking water, the rinsing of the mouth with water after meals, and an increased consumption of fibrous foods, such as apples, at the conclusion of a meal.

* Foreign Letters, J.A.M.A., March 26, 1955, p. 1149.

DENTAL TREATMENT OF CARDIAC PATIENTS*

TO THE EDITOR:—*What recommendations should be given the dentist regarding (1) treatment of cardiac patients, especially those with a history of rheumatic carditis and coronary occlusion; those suffering anginal syndrome; hypertension with and without cardiac complications; and arteriosclerotic heart disease; (2) choice of a preanesthetic sedative, local anesthetic, and use of epinephrine derivatives to be combined with anesthetic; (3) maximum concentrations and quantity of each drug usable with reasonable safety.?*

M.D., New York

ANSWER.—In providing recommendations for dental treatment of cardiac patients one must bear in mind the hazards to which the patient may be exposed. Anxiety and pain lead to rise in pulse rate and blood pressure and may precipate angina pectoris, bouts of pulmonary congestion, or dangerous hypertensive episodes in susceptible individuals. Patients with congenital or rheumatic heart disease are further subjected to the risk of subacute bacterial endocarditis because of bacteremia during tooth extractions and other dental manipulations that disturb the gums. Certain drugs, including epinephrine and procaine (or related local anesthetics), may also result in undesirable reactions. Although the amount of epinephrine used in dental work is usually small (1 to 5 cc. of 1:60,000 to 1:100,000 solution), there is always the possibility of accidental intravenous injection. Hyperthyroid and hypertensive patients are particularly susceptible to the untoward responses noted after administration of this drug, including anxiety, cardiac arrhythmias, and sharp rises in blood pressure. Anginal pain may be induced in patients with coronary heart disease. Some patients are also adversely affected by the central nervous stimulation that procaine may produce.

In view of these hazards, certain general suggestions should be offered to the cardiac patient who

requires major dental treatment. The patient should seek a dentist in whom he has the utmost confidence. Phenobarbital 15 to 30 mg. (or other barbiturate in sedative doses) may be given an hour or two before the dental treatment to relieve worry and counteract the nervous excitability that sometimes follows the use of procaine. Prolonged sessions in the dentist's chair, including the extraction of many teeth at one time, should be avoided. Patients with rheumatic or congenital heart disease should receive penicillin prophylaxis against subacute bacterial endocarditis; e. g., 600,000 units of aqueous penicillin and 600,000 units of procaine penicillin in oil containing 2% aluminum monostearate given intramuscularly 30 minutes before dental extraction. Patients with coronary heart disease and angina pectoris will often be spared an attack of coronary insufficiency if whiskey or glyceryl trinitrate is administered immediately before the dental work is to begin. Of course, dentistry should temporarily be avoided altogether in patients seriously ill with recent myocardial infarction, angina decubitus, severe congestive failure, or acute rheumatic fever. Epinephrine is widely employed in solutions of local anesthetics to limit absorption and prolong the duration of effect of the anesthetic agent. Usually it does no harm. Although there is no general agreement on this point, it seems wiser to avoid the use of epinephrine in patients with hypertensive or coronary heart disease. Procaine (1% solution) or a related local anesthetic in amounts of from 1 to 5 cc. is ordinarily well tolerated by cardiac patients, particularly if a barbiturate has been previously administered.

* Queries and Minor Notes, J.A.M.A., May 28, 1955, p. 356.

TEETHING POWDERS AND MERCURY POISONING*

Teething powders containing mercury with chalk have long been used by mothers in Great Britain as a laxative. Dr. Barnet Stross asked the Minister of Health in the House of Commons what information he has received on the association of mercury poisoning in infants after the ingestion of teething powders or tablets containing mercury, for the treatment of acrodynia (pink disease); how many infants had died within the last two years from acrodynia and how many from mercurial poisoning; and in how many cases both factors applied. The Minister replied that he was advised that the association between mercury poisoning and acrodynia had not been clearly established. He said that many cases of acrodynia had no demonstrable association with the ingestion of mercury and that most children who had been given mercurial preparations showed no sign of the disease. Possibly some infants showed exceptional sensitivity to mercury. In 1952 and 1953, 64 children under 5 years of age were reported as dying from acrodynia and 4 from mercury poisoning; in two cases acrodynia and mercury poisoning were associated. As some physicians consider that mercury is a dangerous drug to give to infants, the Minister of Health is considering whether mercury with chalk should cease to be issued from child welfare clinics. If a laxative is necessary, more effective and innocuous preparations are available.

* Foreign Letters, J.A.M.A., July 9, 1955, p. 866.

TOOTHPASTE*

TO THE EDITOR:—*What is the value, if any, of the "magic ingredients" now being added to practically all brands of toothpastes?*

C. Jay Hoyt, M.D., San Francisco.

ANSWER.—The principal value of these ingredients may be in sales appeal. At this date the Council on Dental Therapeutics is not aware of adequate evidence that these ingredients are of substantial value in dental caries prophylaxis. Brushing the teeth with a suitable brush and dentifrice immediately after eating reduces residual carbohydrate, which is an important factor in tooth decay. Further benefit from a specific ingredient is doubtful in presently available products.

* Queries and Minor Notes, J.A.M.A., July 30, 1955, p. 1238.

CLICKING IN EAR

TO THE EDITOR:—*A patient has had head noises, loss of hearing, and a rather bad postnasal drip since the age of 20. Ten years ago a fenestration of the semicircular canals was performed. The patient now experiences a clicking in the ear that was operated on, especially when he swallows. The clicking starts about 7:30 p.m. and is very bad at night, when the patient is lying down, and in the morning. There is little clicking during the day. During the times of the clicking, the patient experiences no pain. At night, when the clicking starts, the patient has developed a compulsion to swallow. What is the cause and treatment?*

M.D., New York.

ANSWER.—Clicking sounds in the ear may originate from three possible sources. First, there may be an abnormal amount of sticky mucus in the eustachian tube and over the torus. When the levator and tensor veli palatine muscles are tensed, as in swallowing, this action may form a film that, on breaking, may produce a clicking sound. Second, a rhythmic tic of the above muscles may be present, producing a rhythmic sound. This can be identified easily by observing rhythmic contractions of the palate on the involved side. Third, clicking sounds in the ear have been observed to persist after bougienage of the eustachian tube. It has been thought that this may be secondary to an injury to the tensor tympani or its

nerve supply. These types of ear noises usually are not amenable to treatment, although sedatives may be tried. Fifty milligrams of chlorpromazine hydrochloride given three times a day might be suggested. Postnasal drip probably would not have causal significance in association with this symptom.

* Queries and Minor Notes, J.A.M.A., July 30, 1955, p. 1236.

STREPTOMYCIN*

TO THE EDITOR:—*Please give information regarding the prolonged or overuse of dihydrostreptomycin. Is it possible to have, in addition to or without auditory nerve damage, marked ataxia or symptoms of cerebellar disease and also marked psychological disturbances?*

S. F. Pfohl, M.D., Winston-Salem, N. C.

ANSWER.—Many patients receiving the streptomycins for prolonged periods experience unpleasant reactions on the days that the drug is administered. Among commonly noted symptoms are circumoral paresthesias, lassitude and a drunk or "hangover" feeling, vertigo and ataxia, and headache and difficulty in visual accommodation. The symptoms usually begin within one to two hours after injection and persist for 1 to 24 hours. Their origin has not been definitely established. The vertigo, ataxia, and paresthesias may represent a mild form of the more severe neurotoxicity of streptomycin such as may follow intrathecally given streptomycin or large doses of streptomycin. In patients who experience severe reactions, alleviation of the symptoms is often obtained if the streptomycin injection is given shortly before the patient retires for the night.

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* Queries and Minor Notes, J.A.M.A., July 16, 1955, p. 999.

SUGAR AND DENTAL CARIES

Evidence that increased consumption of sugar has no significant effect on the development of dental caries in children is to be found in a report recently published under the aegis of the Medical Research Council (King, J. D.; Mellanby, M.; Stones, H. H., and Green, H. N.: The Effect of Sugar Supplements on Dental Caries in Children, Medical Research Council Special Report, no. 288). The report is based on a carefully controlled investigation of over 700 children, aged 2 to 14 years, in institutions in London, Liverpool, and Sheffield. The children were first observed for one year on their regular diet, in order to ascertain the natural caries increase. They were then divided into control and test groups; the latter were given an additional supplement of refined or raw sugar for periods of one to two years; and the incidence of caries was assessed in both groups at the end of this time. It was found that the children in Liverpool and Sheffield, whose ages ranged from 3 to 14 years, were receiving 466.5 to 730.9 gm. (15 to 23.5 oz.) of sugar a week in their regular diet. During the period of observation those in the test groups received a supplement of 684.3 gm. (22 oz.) of refined sugar per week. As the children in the London groups were aged only 2 to 4 years, and as their normal sugar intake ranged from 388.8 to 715.4 gm. (12.5 to 23 oz.) a week, it was decided that they would not be able to cope with a further 684.3 gm. a week. It was therefore decided that those in the control groups should receive about 342.1 gm. (11 oz.) a week, and those in the test groups were given 684.3 gm. of either white or brown sugar a week.

The results demonstrate that relatively great differences in the total sugar content of the diets of children in institutions had no significant effect on the initiation and spread of dental caries in periods of one to two years. As regards the deciduous teeth, there was, as a whole, no evidence that sugar as administered in this investigation resulted in any increase in caries. In the case of the permanent first molars, although the groups fed additional sugar tended to show a slightly greater increase in, and spread of, caries than the control groups, the total figures for these teeth did not disclose any consistently significant differences. A comparison of the London children receiving supplements of sugar showed a caries experience in those receiving brown sugar similar to that of those receiving white sugar and the controls.

* Foreign Letters, J.A.M.A., July 23, 1955, p. 1045.

CAUSES OF DELAY IN DIAGNOSIS OF CANCER*

A study of 1,000 unselected patients from the outpatient department of the National Institute of Neoplastic Diseases, carried out with the object of elucidating the causes of delay in the diagnosis of cancer, was reported by Dr. E. Cáceres Graziani, director of the institute, and his co-workers at the last meeting of the Inter-American College of Surgeons. The patient is considered to be at fault if the time between the onset of the first symptom or the discovery of the first sign and the first medical consultation is longer than three months or if he consulted a physician within this time but refused to follow appropriate advice. The responsibility of the physician starts as soon as the patient seeks medical advice. A month is considered ample time for a physician to make a diagnosis, advise properly, or refer the patient to a hospital for special study if his condition did not improve, but the time between the

first and last medical consultations might be prolonged by the patient beyond a month. Therefore this period of time is not an absolute criterion for evaluating the physician's responsibility. On the other hand, it is possible for the patient to see two or more physicians and still report to the final consultation within a month. The patient and the physician are both considered to be at fault if a combination of the above factors is present. The physician is not at fault if the patient is referred without a diagnosis but within a month. The important factor is that the physician should recognize the seriousness of the disease and refer the patient either to a cancer hospital or a specialist.

In this series the patient alone was responsible for the delay in 48.8% of cases; both patient and physician were responsible in 12.1%; the physician alone was responsible in 13.6%; and there was no delay in 25.5%. Ignorance was by far the most important cause of delay on the part of the patient, other causes being fear, economic reasons, poor advice from the family or friends, and lack of ability to face the facts. Inability to make a diagnosis within a month was the main cause of delay on the part of the physician, others being wrong treatment due to either mistaken interpretation of the symptoms or an incomplete examination of the patient, wrong advice to the patient, lack of both advice and treatment, and adequate treatment but delay in referring a patient who failed to improve to a specialist or cancer clinic. Among patients with cancer of the skin, the diagnosis was delayed in 93.9%. Among those with cancer of the lips, esophagus, bladder, and vulva, diagnosis was delayed in 100%. Late diagnosis in gastric cancer is the fault of the physician in 54.5%.

* Foreign Letters, J.A.M.A., July 16, 1955, p. 968.

PERNICIOUS ANEMIA*

TO THE EDITOR:—*I am interested in pernicious anemia and would like information especially as to the length of time a patient may have the disease before proper diagnosis or sufficient symptoms appear to make such a diagnosis.*

M.D., New Jersey.

ANSWER.—Pernicious anemia, with or without neurological component, is a manifestation of vitamin B_{12} deficiency. Irreversible gastric atrophy and achylia gastrica are constant findings. The disease usually results from decrease of the intrinsic factor of normal gastric juice. This substance, which is perhaps a mucoprotein, specifically facilitates the difficult absorption of dietary vitamin B_{12}. Any derangement of the balance of intrinsic factor secretion, vitamin B_{12} intake, and intestinal absorption may in time result in vitamin B_{12} deficiency. Probably about 1 mcg. of vitamin B_{12} must be assimilated daily for health. The interval required for this deficiency state to develop depends on the degree of failure of absorption and in addition on the total body store of vitamin B_{12} and its rate of depletion. Following total gastrectomy this may require two or three years. In most instances of the spontaneous disease the duration of symptoms is of the order of 6 to 12 months. However, among patients with pernicious anemia in remission many may not experience signs or symptoms of relapse until two or more years after therapy has been stopped. Early diagnosis depends on further studies that are indicated by the persistence of commonplace gastrointestinal (glossitis, anorexia, "gas") and/or suggestive neurological (symmetrical paresthesias or ataxia) symptoms. Absence of such symptoms in a third of the patients or failure to recognize their significance in others can easily lead to overlooking the relatively subtle early changes in peripheral blood or bone marrow until the anemia has became severe or spinal cord lesions disabling. It must be appreciated that, without the characteristic symptoms and without at least a hemoglobin determination and inspection of a blood smear, patients with pernicious anemia may pass for months as having hypochondriasis, heart trouble, chronic indigestion, or even flat feet. Until the diagnosis of pernicious anemia has ben definitely excluded, it is important not to obscure the blood picture further nor possibly to accelerate the progress of spinal cord disease by the oral use of folic acid or of vitamin mixtures containing this vitamin. When the diagnosis of pernicious anemia is established, the parenteral injection of 30 mcg. of vitamin B_{12} either as such or as liver injection U. S. P. should be initiated at weekly intervals. After one or two months similar injections at monthly intervals are adequate maintenance therapy.

* Queries and Minor Notes, J.A.M.A., Aug. 6, 1955, p. 1328.

Book Reviews

Oral and Dental Diagnosis, by Kurt H. Thoma and Hamilton B. G. Robinson, W. B. Saunders Co., Philadelphia, 1955, 449 pages, 928 illustrations, 55 in color, $10.50.

This standard work is completely reorganized in joint authorship with Dr. Robinson. Originally, the text constituted a reference work for the dental practitioner, the material being arranged for easy diagnosis of signs and symptoms. The revised edition serves in addition as a text on oral diagnosis for dental students. The book covers disorders of the teeth, jaws and other organs and tissues of the mouth. Part I deals with the philosophy of treatment planning and special methods of examination. Part II deals with the specific diagnosis of dental and oral diseases, then with pertinent suggestions for individualized treatment.

Each subject is evaluated in terms of its pathogenic foundation on the basis of which rational therapy is formulated. Each chapter is interspersed with instructive illustrations of common and rare disorders of the mouth and its adnexia. The discussion being interspersed succinctly with recent advances as evidenced from carefully selected literature. The book is a great improvement on the previous editions with the elimination of controversial matters and the inclusion of the methods of diagnosis and treatment. This ready reference is invaluable not only for dental but medical practitioners in all specialties.

I. NEWTON KUGELMASS, M.D.

A Textbook of Physiology, Edited by John F. Fulton, M.D., W. B. Saunders Company, Philadelphia, 1955.

This new up-to-the-minute revision of physiology under the editorship of Dr. Fulton is derived to meet the needs of medical students, clinicians and investigators. It stresses the application of pure sciences to physiology, inculcates the general principles in the field, interprets the functions of various tissues, organs and systems and correlates physiologic alterations produced experimentally with aberrant manifestations illustrated on patients. The book is divided into several sections embodying complete discussions of various sides of controversial questions with beautiful illustrations and abundant references. The subject matter embodies every phase of physiology—Section I, Principles of Nervous Activity; Section II, Muscle; Section III, Motor Functions; Section IV, Sensory Functions; Section V, Blood Constituents; Section VI, Organs of Circulation of the Blood and Lymph; Section VII, Respiration; Section VIII, Body Fluids and Kidney Function; Section IX, Physiology of the Digestive System; Section X, Metabolism and Nutrition; Section XI, The Endocrine System; Section XII, Physiology of Reproduction.

The book is particularly valuable to the clinician for each disease is regarded as nature's experiment on human beings and its signs and symptoms as manifestations of altered function. It enables the physician to understand the functional disturbances of patients rather than to make diagnoses on an empirical basis.

I. NEWTON KUGELMASS, M.D.

The Hypophyseal Growth Hormone, Nature and Action, Editors Richmond W. Smith, M.D., Oliver H. Gaebler, M.D., C. N. H. Long, M.D., The Blakiston Division, McGraw-Hill Book Company, New York, 1954.

These monographs on the growth hormone represent an International contribution under the auspices of the Ford Institute for medical research. The enigmatic pituitary growth hormone has been under study for a whole generation by most of the authors, since Long and Evans detected growth-promotion in the crude extracts of the anterior hypophysis. The symposium was divided into five parts, each concerned with growth hormone effects on certain structures. The first represents the preparation and purpose of the growth hormone, the second, the effects of the growth hormone on body structures, the third, the relation between growth hormone and energy sources, the fourth, growth hormone and cellular systems and the fifth, effect of growth hormone on human metabolism. There is unanimity of opinion that there is a specific pituitary growth hormone, that it can be isolated intact and in amount that will permit extensive experimentation and that it does manifest anabolic properties in man. Perhaps our thinking has been conditioned to the rapid metabolic actions of corticotropin and we expect unreasonably that growth hormone will induce immediate and measurable change. If we consider the growth processes, we will appreciate that even under optimal circumstances it proceeds at limited rates. Broadly characterized, normal growth is a subliminal, steady and usually proportionate phenomenon. The limits of our yardsticks must be heeded and it would be artless science to expect in short-term experiments quantitative, or even qualitative, duplications of naturally occurring growth. This symposium was held to sift over the rapidly accumulating data, to compare techniques of study, to attempt a resolution of disturbing differences, and to simulate new approaches which some day may bring usefulness to this most intriguing pituitary substance.

I. NEWTON KUGELMASS, M.D.

Academy Proceedings

AMERICAN ACADEMY OF DENTAL MEDICINE ANNOUNCES MID-ANNUAL MEETING

The American Academy of Dental Medicine will hold its Tenth Mid-Annual Meeting and Luncheon at the Hotel New Yorker in New York City on Sunday, December 4, 1955, 12:30 P.M. There will be a business meeting for members at 10:30 A.M.

From 2 P.M. to 5 P.M., following the luncheon, there will be a symposium on "The Oral Soft Tissue in Health and Disease." Participating will be Dr. Edward V. Zegarelli of New York City, Dr. Hamilton B. G. Robinson of Columbus, Ohio, and Dr. Lester W. Burket of Philadelphia, Pa.

All members and interested dentists and physicians are cordially invited to attend. For reservations and programs, address the National Secretary, Dr. George J. Witkin, 45 South Broadway, Yonkers 2, N. Y., or the Chairman, Dr. Alonzo N. De Vanna, 3063 Buhre Avenue, New York 61, N. Y.

DR. RAYMOND J. NAGLE TO BE HONORED

Dr. Raymond J. Nagle, Dean of the New York University College of Dentistry, who was recently elected to honorary membership of The American Academy of Dental Medicine, is to be the guest of honor at the annual dinner of the Dental Division (Manhattan and Bronx) of the Federation of Jewish Philanthropies. The dinner will be held on Wednesday evening, November 16, 1955 in the Grand Ballroom of the Hotel Pierre, Fifth Avenue at 61st Street, New York City.

The price of the dinner is $7.50 per person including liquor and gratuities. Dress is informal and ladies are cordially welcomed. There will be no announcement of individual contributions. Reservations can be made by contacting Mr. Louis J. Weber, Executive Secretary of the Dentists Division, Federation of Jewish Philanthropies, 130 East 59th Street, New York 22, N. Y.

SIDNEY SORRIN, D.D.S., *Chairman*

ACADEMY MEMBER RECEIVES FULBRIGHT GRANT

Dr. Joseph S. Landa, a member of the New York University College of Dentistry faculty for the last 30 years, has received a Fulbright grant to lecture on dentistry in Japan during the 1955-56 fall term. He will make his headquarters at the University of Tokyo, but will speak before faculty members of a number of dental and medical schools in Japan.

Dr. Landa received his doctor of dental surgery degree in 1925 from New York University College of Dentistry, and stayed on at the College as an instructor in denture prosthesis. The author of 48 scientific papers and four texts on his dental specialty, Dr. Landa is now associate professor of denture prosthesis in the College's graduate division.

He holds active or honorary memberships in 11 professional societies and has been cited three times by the American Dental Association for his scientific and health exhibits. In 1953 he was awarded the Lord-Chaim Prize of the First District Dental Society of New York for a "meritorious essay" on original research.

Dr. and Mrs. Landa left for Tokyo in September and will return to New York University in February, 1956.

MONTREAL SECTION

The last annual meeting of the Montreal Section of the American Academy of Dental Medicine was held on May 4th, 1955 at the Reform Club. The following officers were elected to serve for one year:

President	DR. VICTOR DUBE
President-elect	DR. EUGENE DORION
Secretary-Treasurer	DR. A. L. SCHERZER
Executive	DR. R. WIENER
	DR. L. LEPINE
	DR. H. OLIVER
Delegate	DR. LOUIS ROSEN

A. L. SCHERZER

NEW JERSEY SECTION

The fall meeting of the New Jersey Section of the American Academy of Dental Medicine will be held on Tuesday evening, October 11, 1955. Dinner will be at 6:30 P.M. and at 8:00 P.M., Dr. D. Walter Cohen will discuss "Concepts of Cure in Periodontal Therapy." In discussing healing, he will show histological similarity between Periodontics and Endodontics in repair.

Members of the Academy and guests are cordially invited to attend. The dinner and meeting will be held at the Hotel Douglas, Newark, New Jersey.

MORTON DE SCHERER

DENTAL RESIDENCY IN ORAL MEDICINE ESTABLISHED

After a long period of concerted effort by a group of far-seeing and progressive educators, a program creating a Dental Residency in Oral Medicine has been established at Montefiore Hospital, Bronx, N. Y. Many men have labored long hours in order to reach this harmonious collaboration between the hospital and New York University College of Dentistry, and the culmination of their efforts has been this broad, liberal and wide reaching program.

That the need for the residency exists can no longer be argued, and it is only proper that recognition for their efforts should go to the men willing to assume the responsibility for its success. Foremost among these are Dean Raymond J. Nagle of New York University College of Dentistry, Dr. Martin Cherkasky, Medical Director of Montefiore Hospital, Dr. David Tanchester, Chief of the Dental Service, Dr. Samuel Charles Miller, Professor and Chairman of the Department of Periodontia and Oral Medicine at New York University College of Dentistry; and Dr. Sidney Sorrin, representing the American Academy of Dental Medicine.

The program started July 1, 1955 at Montefiore Hospital.

From July 1 until September 18, 1955 instruction is given at the hospital dental clinic by dental specialists in Periodontics, Orthodontics, Temperomandibular joint disturbances, Ortho-maxillary facial prosthesis, Roentgenology, and Surgery.

From September 19 thru October 28 the resident will attend Basic Science Courses in Pathology, Histology, Microbiology, Anatomy and Pharmacology at the Dental College under the supervision of Dr. Earl O. Butcher, Assistant Dean. Free time will be spent in the Department of Periodontia and Oral Medicine under the supervision of Dr. Samuel Charles Miller.

From then until June 30, 1956, all instruction will be given by medical specialists at Montefiore Hospital. Resident's time will be devoted to grand rounds, lectures, seminars, conferences and clinics. Additional time will be given to interne instruction and to patients in the dental clinic.

SIDNEY SORRIN, *Chairman*
Residency Committee, American Academy of Dental Medicine.

AMERICAN ACADEMY OF DENTAL MEDICINE TENTH ANNUAL MEETING

The Michigan Section will be the hosts for the Tenth Annual Meeting of the American Academy of Dental Medicine which will be held at the Statler Hotel in Detroit, June 21st through June 24th, 1956.

The there for this meeting will be "Systemic Disease". The oral manifestations of systemic diseases and the role of the dentist in treatment will be discussed. A complete program will appear in a future issue of the Journal.

JAMES R. LADD, *Co-Chairman*

Announcements

POSTGRADUATE TRAINING IN PERIODONTIA AND ORAL MEDICINE

NEW YORK UNIVERSITY COLLEGE OF DENTISTRY

The following postgraduate courses in Periodontia and Oral Medicine will be offered at the New York University College of Dentistry and will be given by Dr. Samuel Charles Miller and Staff:

No. 124. REFRESHER COURSE IN PERIODONTIA AND ORAL MEDICINE
Ten sessions, Wednesdays, 4:00 to 6:00 P.M.
February 29, 1956 to May 10, 1956.
Tuition and books. $156.00. Instruments approximately $55.00.

Theoretical and practical application of periodontal diagnosis and techniques to general dentistry. Four lecture and six clinical demonstration sessions. Equilibration of occlusion is performed by the student on casts. Patient demonstrations include equilibration of occlusion, conservative and radical therapy, home care, etc.

No. 123. PERIODONTIA AND ORAL MEDICINE IN THE SPANISH LANGUAGE
Four weeks, Monday through Friday, 9:00 A.M. to 4:00 P.M.
April 2 to April 27, 1956 inclusive.
Tuition including books and instruments approximately $385.00.

Theoretical and practical application of Periodontia and Oral Medicine is fully explained and demonstrated. Equilibration of occlusion is performed by the student on casts. Lectures and clinical demonstrations of diagnosis and treatment planning, conservative and radical techniques, equilibration of occlusion, home care, etc. The entire course is conducted in the Spanish language.

No. 122. COMPREHENSIVE PREPARATION IN PERIODONTIA AND ORAL MEDICINE

No. 122 A. One academic year, full time. September 19, 1955 to May 25, 1956.
Tuition $1,010.00. Instruments and books approximately $135.00.

No. 122 B. Two academic years, full time. September 19, 1955 to May 24, 1957.
Tuition $1,770.00 (two years). Instruments and books approximately $231.00.

No. 122 C. Two academic years, half time. September 19, 1955 to May 24, 1957. (Two and one half days weekly.)
Tuition $1,010.00 (two years). Instruments and books approximately $135.00.

No. 122 D. Four academic years, half time. September 19, 1955 to May 29, 1959. (Two and one half days weekly.)
Tuition $1,770.00 (four years). Instruments and books approximately $231.00.

These courses are designed for comprehensive preparation in Periodontia and Oral Medicine and are of particular significance for certification towards specialization. All didactic and clinical phases are covered with the objective of developing expert proficiency.

Further information concerning the courses listed above can be obtained by writing to the Secretary, Postgraduate Division, New York University College of Dentistry, 209 East 23rd Street, New York 10, New York.

ADVANCES IN GENERAL PRACTICE TO BE FEATURED AT THE GREATER NEW YORK DENTAL MEETING

The theme of the 1955 Greater New York Dental Meeting will be the portrayal of scientific and technical advances in dentistry. This was recently announced by Dr. Matthew Besdine, General Chairman. The contributions of the various areas of the profession, (such as periodontics, endodontics, full mouth rehabilitation, restorative dentistry, prosthodontics and crown and bridge), to chairside dental practice of the family dentist, will be presented through the use of Television, Registered Clinics, Topic Discussions, Exhibits, and Projected Clinics. The role of dental research will be shown through a number of exhibits depicting the "Frontiers of Dental Research."

Color screens of 4½x6 feet in size will permit 1,000 viewers to benefit at one time, by close-up magnification of techniques heretofore seen only in small groups. These closed circuit views will be televised and graciously sponsored by Smith, Kline & French Laboratories of Philadelphia, Pa.

Projected Table Clinics in color will again be presented by prominent practitioners of New York City and its environs.

In addition, there will be 36 registered 1½ hour clinics and several audience participated discussions. These, presented by 60 men, eminent in their respective fields from this country and Canada.

For additional information write to the Executive Secretary, Mrs. Mabel Purdy, Suite 106 A, Hotel Statler, New York 1, N. Y.

TUFTS UNIVERSITY SCHOOL OF DENTAL MEDICINE

The following courses listed below will be presented at Tufts University School of Dental Medicine during 1955-1956. Application and further information may be obtained by writing the Director, Division of Graduate and Postgraduate Studies, Tufts University School of Dental Medicine, 136 Harrison Avenue, Boston 11, Mass.

DPG. 601—Participation Course in Periodontology

Monday through Friday for One Week From November 7 through 11, 1955

Tuition $150.00 Class limited to twelve

Dr. Irving Glickman & Staff

DPG. 302—General Anesthesia

Each Wednesday for Eight Weeks From January 4 to February 29, 1956

Tuition $150.00 Class limited to fifteen

Dr. Edward Sleeper and Staff

DPG. 603—Temporary Splinting and Minor Tooth Movement in the Management of Periodontal Problems

January 16, 17, 18, 1956 Monday through Wednesday Tuition $75.00

Dr. Leonard Hirshfeld

DPG. 605—A Course In Practical Periodontology (To be taught in Spanish)
February 6 through February 18, 1956
Tuition $200.00 Cost of Instruments $75.00
Presented by
Dr. Irving Glickman & Staff, including Fermin A. Carranza, Dr. Javier Restrepo, Dr. Aurelio Neverri, and Dr. Violeta A. Glickman

DPG. 401—Orthodontics
Each Wednesday for Eight Weeks from February 8 to April 4, 1956
Tuition $150.00 Class limited to ten
Dr. Herbert I. Margolis and Staff

DPG. 706.—Applied Principles in Crown and Bridge Prosthesis
Monday through Friday, March 19 through March 23, 1956
Monday through Friday — March 19 through March 23, 1956 Tuition $150.00
Dr. Ernest B. Nuttall

DPG. 701—Full Denture Prosthesis
One Week—June 4th through June 8, 1956 — Tuition $150.00 — Class limited to seven
Dr. Irving Hardy

COLLEGE OF DENTISTRY, OHIO STATE UNIVERSITY

The Ohio State University College of Dentistry has arranged a series of postgraduate courses to be presented during 1955-1956 for the general practitioner of dentistry and those interested specialists. Most of these courses are given for 5 consecutive days—Monday thru Friday—and the enrollment of each course is limited in order ot permit intimate teaching. The fees vary from $35 to $100 per course. The new course, Clinical Periodontics, will be open only to those who have had a postgraduate course in Periodontology at Ohio State University.

The 1955-1956 schedule of postgraduate courses is as follows:

Oct. 3-7	General Anesthesia	Dr. M. L. Allison & Staff
Dec. 5-9	Complete Denture Prosthodontics	Dr. Carl O. Boucher
Feb. 13-17	Clinical Oral Pathology and Diagnosis	Dr. Hamilton B. G. Robinson
Feb. 20-24	Complete Denture Prosthodontics	Dr. Carl O. Boucher
March 5-9	Endodontics	Dr. J. Henry Kaiser
March 26-30	Partial Denture Prosthodontics	Dr. Victor L. Steffel
April 2-6	Crown and Bridge	Dr. Frank C. Starr
April 9-13	Complete Denture Prosthodontics	Dr. Carl O. Boucher
April 18 & 19	Post-College Assembly	Dr. M. L. Allison & Staff
April 30-May 4	Oral Surgery	Dr. M. L. Allison & Staff
May 10, 11, 12	New Advances in Restorative Dentistry	Dr. W. Lefkowitz, Dr. H. Postle & Mr. R. Phillips (Indiana U.)
May 14-18	Pedodontics	Dr. Pettit & Dr. Williams
May 21-25	General Anesthesia	Dr. M. L. Allison & Staff

June 4-8	Periodontology and Soft Tissue Lesions	Dr. Robinson & Dr. Wilson
June 11-15	Clinical Periodontics	Dr. John R. Wilson
June 11-15	Anatomy of Head and Neck	Dr. Linden F. Edwards

For further information and application, address inquiries to College of Dentistry, Ohio State University, Columbus 10, Ohio.

NORTHWESTERN UNIVERSITY DENTAL SCHOOL

Northwestern University announces fifteen short postgraduate courses to be given during the academic year 1955-56. Courses in Operative Dentistry, Oral Surgery, Periodontia, Orthodontics, Pedodontics, Crown and Bridge, Pathology, and Histology are included, as well as specific courses in diagnosis and medical problems in relation to dentistry. The courses will be given by prominent dental teachers from the faculties of Northwestern University Dental School and other well-known dental schools, and by prominent clinicians.

The courses will deal primarily with modern practices in dental art and technology and are designed to enable the general practitioner or specialist to keep abreast of present and future developments in his field.

The dates of the courses and other detailed information can be obtained by addressing the Director of Dental Postgraduate Study, Northwestern University Dental School, 311 E. Chicago Avenue, Chicago 11, Illinois.

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